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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/561,931	04/18/2006	Takaki Sugimoto	58924US006	3205

32692 7590 06/24/2010

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EXAMINER	
BELL, WILLIAM P	

ART UNIT	PAPER NUMBER
1791	

NOTIFICATION DATE	DELIVERY MODE
06/24/2010	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/561,931	SUGIMOTO ET AL.	
	Examiner	Art Unit	
	WILLIAM P. BELL	1791	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 April 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4-11 and 14-24* is/are pending in the application.

4a) Of the above claim(s) *11 and 14-18* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,4-10 and 19-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 January 2009* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 8-10, and 19-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morris (U.S. Patent No. 5,792,411, already of record) in view of Mitwalsky (U.S. Patent No. 4,843,363, already of record) for the reasons cited in the previous Office action. Regarding claim 1, Morris teaches a master mold (see column 3, lines 49-56) which may be comprised of a variety of materials, including glass, ceramic, or metal materials (see column 4, lines 46-52). Morris further teaches that the master tool may be formed from a multi-layered substrate comprising a combination of materials in the layers (see column 5, lines 4-7). Morris teaches that the master tool is formed by laser ablation of the substrate using a mask, thereby imparting the desired microstructure to the substrate (see column 5, lines 14-39). Mitwalsky teaches a process for laser ablation (see column 2, lines 10-14) of a multi-layered structure comprising a metal layer covered by a ceramic material (see column 2, lines 55-60, wherein silicon nitride is a known ceramic material). Mitwalsky teaches that by having a metal layer underlying the ceramic layer, the depth to which the ablation process proceeds can be precisely limited provided that the energy density of the laser is lower

than that required for ablation of the metal (see column 4, lines 34-37). As a result, the metal layer is exposed upon completion of the ablation process. Since the ceramic material can be ablated using a lower energy density than the metal, it must have a lower grinding speed. It would have been obvious to one of ordinary skill in the art at the time of the invention to have selected materials for the master mold taught by Morris consisting of a ceramic material on a metal layer, as taught by Mitwalsky, for the benefit of providing a configuration in which the depth of the ablation process and resulting microstructure could be controlled precisely and automatically without the need for end point detection systems (see Mitwalsky, column 4, lines 31-36).

Regarding claim 8, Morris teaches a master mold (see column 3, lines 49-56) which may be comprised of a variety of materials, including glass, ceramic, or metal materials (see column 4, lines 46-52). Morris further teaches that the master tool may be formed from a multi-layered substrate comprising a combination of materials in the layers (see column 5, lines 4-7). Morris teaches that the master tool is formed by laser ablation of the substrate using a mask, thereby imparting the desired microstructure to the substrate (see column 5, lines 14-39). Mitwalsky teaches a process for laser ablation (see column 2, lines 10-14) of a multi-layered structure comprising a metal layer covered by a ceramic material (see column 2, lines 55-60, wherein silicon nitride is a known ceramic material). Mitwalsky teaches that by having a metal layer underlying the ceramic layer, the depth to which the ablation process proceeds can be precisely limited provided that the energy density of the laser is lower than that required for ablation of the metal (see column 4, lines 34-37). As a result, the ceramic layer is

selectively removed and the metal layer is exposed upon completion of the ablation process. Since the ceramic material can be ablated using a lower energy density than the metal, it must have a lower grinding speed. It would have been obvious to one of ordinary skill in the art at the time of the invention to have selected materials for the master mold taught by Morris consisting of a ceramic material on a metal layer, as taught by Mitwalsky, for the benefit of providing a configuration in which the depth of the ablation process and resulting microstructure could be controlled precisely and automatically without the need for end point detection systems (see Mitwalsky, column 4, lines 31-36).

Regarding claims 9 and 10, the recited processes for removing the high grinding speed material, specifically sandblasting and chemical etching, do not impart any structure to the master mold other than a fine structure pattern. Since the master mold taught by Morris, as modified by Mitwalsky, has such a fine structure pattern, the prior art also reads on these claims.

Regarding claims 19 and 21, Morris does not teach a master mold wherein the bottom portions of the fine structure pattern are flat. Mitwalsky teaches a structure wherein the bottoms of the fine structure pattern are flat (see Figure 3). It would have been obvious to one of ordinary skill in the art at the time of the invention to have selected materials for the master mold taught by Morris consisting of a ceramic material on a metal layer, as taught by Mitwalsky, for the benefit of providing a configuration in which the depth of the ablation process and resulting microstructure could be controlled

precisely and automatically without the need for end point detection systems (see Mitwalsky, column 4, lines 31-36).

Regarding claims 20 and 22, Morris teaches a master mold which may be a multi-layered structure comprised of a variety of materials, including ceramic and metal (see column 4, lines 46-52). Mitwalsky teaches forming a structure comprising a fine pattern wherein the pattern consists of ceramic and the bottom portions consist of a metal material (see column 2, lines 55-60, wherein silicon nitride is a known ceramic material). It would have been obvious to one of ordinary skill in the art at the time of the invention to have selected materials for the master mold taught by Morris consisting of a ceramic material on a metal layer, as taught by Mitwalsky, for the benefit of providing a configuration in which the depth of the ablation process and resulting microstructure could be controlled precisely and automatically without the need for end point detection systems (see Mitwalsky, column 4, lines 31-36).

Regarding claims 23 and 24, Morris teaches a mold which is suitable for duplicating a fine structure with high precision (see column 2, lines 25-27, wherein replication of microstructured arrays is replication of a fine structure with high precision; see also column 9, lines 2-7 and Table III in column 10, wherein a fine structure is formed in the tool and then replicated using the tool).

3. Claims 4, 6, and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Morris (US 5,792,411) and Mitwalsky (US 5,843,363) as applied to claim 1 above, and further in view of Nakada (Japanese Patent Application Publication No. JP-10321126, already of record) for the reasons cited in the previous

Office action. Morris, as modified by Mitwalsky, does not teach a master mold suitable for making plasma display panel ribs or having a grid-like protrusion pattern. Nakada teaches a master mold comprised of metal (see [0033]-[0034] and Figure 2). Regarding claim 4, the master mold taught by Nakada is suitable for making plasma display panel ribs (see [0033]). Regarding claim 6, Nakada teaches that the master mold has a fine structure pattern that is a grid-like protrusion pattern comprising a plurality of ridge-like protrusions arranged substantially parallel while intersecting one another with predetermined gaps among them (see [0016] and Figure 7). Regarding claim 7, Nakada teaches a master mold wherein the fine structure pattern comprises ribs having a rib height of 150 to 300 μm, a rib pitch of 150 to 800 μm, and rib width of 50 to 80 μm (see [0008]). It would have been obvious to one of ordinary skill in the art at the time of the invention to have applied the mold and technique taught by Morris, as modified by Mitwalsky, to the production of a master mold for making plasma display panel ribs, as taught by Nakada, for the benefit of producing the master mold at high speed and significantly reduced cost (see Morris, column 11, lines 61-63).

4. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Morris (US 5,792,411) and Mitwalsky (US 5,843,363) as applied to claim 1 above, and further in view of Yang (U.S. Patent No. 6,382,254, already of record) for the reasons cited in the previous Office action. Morris, as modified by Mitwalsky, does not teach a master mold suitable for making microfluidic articles. Yang teaches the manufacture of microfluidic articles using a master mold and the injection molding process (see column 3, line 64 through column 4, line 8). It would have been

obvious to one of ordinary skill in the art at the time of the invention to have applied the mold and technique taught by Morris, as modified by Mitwalsky, to the production of a master mold for making microfluidic devices, as taught by Yang, for the benefit of producing the master mold at high speed and significantly reduced cost (see Morris, column 11, lines 61-63).

Response to Arguments

5. Applicant's arguments filed 14 April 2010 have been fully considered but they are not persuasive. Applicant argues that the ceramic material on a metal layer taught by Mitwalsky is contrary to the teachings of Morris because Morris allegedly recites a master tool comprising a "flexible substrate" or a "flexible, unitary substrate". Examiner does not dispute that Morris teaches a flexible substrate and/or a unitary substrate, but respectfully notes that Morris is not limited to flexible or unitary substrates. In fact, Morris teaches that the "substrate ... ***may*** be flexible" (emphasis added, see column 4, lines 35-38) and is preferably an integral single piece (see column 5, lines 1-4), but may also be multi-layered (see column 5, lines 4-7). Thus Morris clearly is not limited to a flexible, unitary substrate. Furthermore, Morris explicitly recites ceramic and metal as possible materials for the substrate or for layers of a multi-layered substrate (see column 4, lines 46-52 and column 5, lines 4-7). Thus Morris does not teach away from the proposed combination with Mitwalsky to provide a mold having a ceramic layer on a metal layer. Rather, Morris actually teaches toward the proposed combination by reciting the specific materials.

In response to applicant's argument that Mitwalsky is nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, Morris teaches that laser ablation may be used to form the surface of the master tool (see column 5, lines 14-39) and specifically recites metal and ceramic as suitable materials for the tool. Thus one of skill in the art would look to the art of laser ablation of metal and ceramic for methods of forming structures in such materials. Mitwalsky teaches laser ablation of metal and ceramic and thus is directly relevant to the teachings of Morris.

In response to applicant's argument that there is no teaching, suggestion, or motivation to combine the references, the examiner recognizes that obviousness may be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988), *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992), and *KSR International Co. v. Teleflex, Inc.*, 550 U.S. 398, 82 USPQ2d 1385 (2007). In this case, Morris teaches that laser ablation may be used to form the surface of the master tool (see column 5, lines 14-39) and specifically recites metal and ceramic as suitable materials for the tool. Mitwalsky teaches that the depth of the ablation process for a

ceramic/metal substrate can be precisely controlled without the need for end point detection systems (see column 4, lines 31-36). Thus Mitwalsky provides motivation for one to choose the specific combination of a ceramic on metal for the multi-layered substrate taught by Morris.

Applicant argues that Morris teaches away from a master tool suitable for duplicating a fine structure with high precision because Morris allegedly teaches away from precisely manufactured articles such as those having optical quality surfaces. While Morris does teach that the tooling is suitable for replication of non-optical quality surfaces, Morris teaches tooling that reads on claims 23 and 24. Applicant has provided no definition of the claimed “fine structure”, so it must be given its plain meaning. Morris teaches the ***microreplication*** of articles which have a large number of detailed or shaped geometric structures per given area (see column 5, lines 51-55), and microreplication means that a fine structure is being duplicated, given the normal, plain meaning of the term "fine". Furthermore, Morris teaches a specific example in which an array of holes is formed in a master tool at a density of 10,000 holes per square inch with depths of about 150 to 800 microns and widths of about 120 to 190 microns (see column 9, lines 4-7 and Table III in column 10). While these dimensions may not represent optical quality, they certainly represent a fine structure and are generally in the same order of magnitude as the structures claimed by applicant in dependent claim 7. This master tooling is suitable for duplication with high precision because the precision with which the fine structure is replicated from the master tooling depends on the method by which the replicate is produced, not how precisely the structure was

originally created in the master tool. So long as the method of replicating the structure, which is not part of the apparatus claim, provides for complete filling of the cavities formed in the master tooling and for removal of the cured or solidified article from the tooling, the structure will be replicated with high precision. Thus the tool of Morris is suitable for duplicating the fine structure of the tooling with high precision. Examiner understands applicant's argument that the precision with which the master tooling is produced affects the precision of the replicated structure relative to the desired structure, but respectfully notes that the claim language does not specify the precision with which the master tooling is produced or require that the master tooling be suitable for duplicating a fine structure with high precision relative to the dimensions of the desired article. Rather, the claim only requires that the mold be suitable for duplicating a fine structure, in this case the structure formed into the tooling itself, with high precision because the master tool can be completely filled with an appropriate molding material, the molding material hardened, and the hardened article removed the mold.

Conclusion

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to WILLIAM P. BELL whose telephone number is (571)270-7067. The examiner can normally be reached on Monday - Thursday, 8:00 am - 5:30 pm; Alternating Fridays, 8:00 am - 4:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Crispino can be reached on 571-272-1226. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/WILLIAM P BELL/
Examiner, Art Unit 1791

/Richard Crispino/
Supervisory Patent Examiner, Art Unit 1791